in which ε_1 and ε_2 are the permittivity constants of the first and second layers, respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

A liquid crystal display device and embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows in plan view a pixel of a liquid crystal display device incorporating a transistor-capacitor arrangement using a top gate transistor;

Figure 2 illustrates the components of a liquid crystal display pixel, for explaining the operation of the display device;

Figure 3 shows a cross-section through a liquid crystal display taken along the line X-X in Figure 1, and showing a known arrangement;

Figure 4 shows a first transistor substrate according to the invention using top gate transistors, for use in the liquid crystal display of Figure 1;

Figure 5 illustrates the operating characteristics of a thin film transistor; and

Figure 6 shows a second transistor substrate according to the invention using bottom gate transistors, for use in a liquid crystal display.

It should be noted that these figures are diagrammatic and not drawn to scale. Relative dimensions and proportions of parts of these figures have been shown exaggerated or reduced in size, for the sake of clarity and convenience in the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Transistor substrates according to the invention, and manufactured in accordance with the invention, may form the switching elements of a liquid crystal display device. By way of example, Figure 1 shows the whole area of one pixel of an active matrix display device, to which the invention may be applied. A pixel comprises an electrode pattern 11 and 12 of, for example, ITO formed on an insulating substrate 10. The substrate 10 may comprise a back plate of the display, for example a glass plate or polymer film. Column conductors 11 of the pattern 11, 12 form common source lines of the switching TFTs in the matrix columns. Another part 12a of the pattern 11, 12 forms a